

## Mother-to-child transmission of HIV (3)

Technical Update

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### ***At a glance***

- Mother-to-child transmission (MTCT) is the overwhelming source of HIV infection in young children. Of the 5 million infants infected with HIV since the beginning of the pandemic, about 90% have been born in Africa. However, the number of cases in India and South East Asia appears to be rising rapidly.
- In the absence of preventive intervention, the probability that an HIV-positive woman's baby will become infected ranges from 15% to 25% in industrialized countries and 25% to 35% in developing countries.
- The virus may be transmitted during pregnancy, labour, delivery, or after the child's birth during breastfeeding. Among infected infants who are not breastfed, about two-thirds of cases of MTCT occur around the time of delivery and the rest during the pregnancy (mostly during the last 2 months). In populations where breastfeeding is the norm, it accounts for more than one-third of all transmission.
- In 1994 a regimen using the antiretroviral drug zidovudine (ACTG076 regimen) was shown to reduce MTCT by about two-thirds in the absence of breastfeeding. The regimen, at an average cost of US \$1000 per pregnancy, was too expensive for widespread use in poor countries.
- A trial concluded in Thailand in February 1998 showed that a short regimen of zidovudine pills given during the last weeks of pregnancy cuts the rate of MTCT during childbirth by half, at less than a tenth of the cost of the longer course. Because the women were also given safe alternatives to breast milk, MTCT in the study population was reduced to 9%, compared with a norm in developing countries of 25% to 35 %.
- In 1999, trials conducted in African countries showed that three different short regimen using zidovudine alone, zidovudine + lamivudine or nevirapine were able to reduce to approximately 15-20% the risk of transmission despite breastfeeding for up to 12 months.
- The introduction of MTCT prevention procedures will require -- at the very least -- planning for expanded voluntary counselling and HIV testing

services for women, strengthening prenatal, delivery and postnatal care programmes, and care services for people diagnosed as HIV-positive. It will also require expanding access to antiretroviral drugs and to replacement feeding methods as alternatives to breastfeeding.

- Given the importance of breastfeeding to infant health, but recognizing the part breast milk plays in mother-to-child transmission, UNAIDS, UNICEF and WHO recommend that appropriate alternatives to breastfeeding be made available and affordable for women whom testing has shown to be HIV-positive, while efforts to protect, promote and support breastfeeding by women who are HIV-negative or of unknown HIV status be strengthened.

## **Background**

*Mother-to-child transmission (MTCT) is by far the largest source of HIV infection in children under the age of 15. In countries where blood products are regularly screened and clean syringes and needles are widely available, it is virtually the only source in young children. In June 2000, an estimated 600,000 infants world-wide were infected with the virus, bringing the total number of young children living with HIV to over 1 million. Of the 5 million infants infected with HIV since the beginning of the pandemic, about 90% have been born in Africa, owing to a combination of high HIV prevalence in pregnant women and high fertility rates. However, the number of cases in India and South-East Asia appears to be rising rapidly. AIDS may have already doubled mortality in children under the age of 5 in regions most affected by the virus.*

The virus may be transmitted during pregnancy, labour, delivery, or after the child's birth during breastfeeding. Among infected infants who are not breast-fed, most MTCT occurs around the time of delivery (that is, just before or during labour and delivery). In populations where breastfeeding is the norm, breastfeeding accounts for more than one-third of all cases of MTCT transmission. (See the joint UNAIDS/UNICEF/WHO documents *HIV and Infant Feeding* in the Key Materials.)

In sub-Saharan Africa, MTCT is contributing substantially to rising child mortality rates in many areas. In Harare, Zimbabwe, for example, the death rate among infants in their first year of life increased from 30 to 60 per 1000 between 1990 and 1996. And deaths among one-to-five year olds, the age group in which the bulk of child AIDS deaths are concentrated, rose even more sharply -- from 8 to 20 per 1000 -- in the same period. In a growing number of countries, AIDS is now the biggest single cause of child death.

Most studies estimate the probability that an HIV-positive woman's baby will have the virus as ranging from 15% to 25 % in an industrialized country (if there is no antiretroviral treatment) and 25% to 35% in a developing country. These differences are mainly explained by the frequency and duration of breastfeeding. Other factors known to increase the risk of MTCT include advanced stage of disease in the mother, recent maternal infection, and high fetal exposure to infected maternal body fluids during labour and delivery. The risk of HIV-2 transmission is about 20 times less than that for HIV-1. (For more information see WHO review: HIV in pregnancy in the Key Materials.)

The most important public health measures against MTCT remain the primary prevention of infections in women of childbearing age and the prevention of unwanted pregnancies through adequate family planning.

Until recently there was no means of preventing MTCT during pregnancy, labour and delivery for HIV-positive women who wished to give birth. This situation is now changing as the benefits of various MTCT interventions are being studied and demonstrated. Two used separately or in combination – a regimen of antiretroviral drugs along with replacement feeding -- have already been proven highly effective.

### **Antiretroviral drugs**

Until 1998, only one drug regimen had been proven to reduce the risk of HIV transmission from mother to child. A study called ACTG 076 found that zidovudine (ZDV, also known as AZT) given orally starting in the fourth month of pregnancy, intravenously during labour, and for six weeks to the infant in a non-breastfed population, reduced mother-to-child transmission of HIV by two-thirds.

The ACTG 076 regimen, though now provided routinely in most industrialized countries, is not well suited to widespread use in many developing countries for cost and logistical reasons. Costing an average \$1000 per pregnancy in industrialized countries, it requires both oral (i.e., pills) and intravenous administration, and must be started by the mother as early as possible during the second trimester of pregnancy. The early start is a severe disadvantage since many pregnant women in developing countries do not seek or access prenatal care until beginning of labour.

Recently, however, the situation changed dramatically for the better. A CDC-sponsored trial concluded in Thailand in February 1998 showed that a short course of ZDV pills given to women during the last four weeks of pregnancy and labour cuts the rate of vertical transmission during childbirth by half. The average cost of the ZDV in Thailand is US \$50 per pregnancy (drug cost only, using a Thai-manufactured generic). Because the women in the study were also given safe alternatives to breast milk, the short treatment reduced MTCT in the study population to 9%, compared with 18% in the control group who did not receive a placebo but did receive replacement feeding (as mentioned, the norm in predominantly breastfeeding populations is 25-35%).

Results from a number of studies in breastfeeding populations indicate that a short course of antiretrovirals can still reduce the transmission of HIV from the mother to the baby, though not as well as when mothers do not breastfeed. In the pooled analysis of two studies, conducted between 1995 and 1998 in Abidjan, Côte d'Ivoire, and Bobo-Dioulasso, Burkina Faso, it was found that the rate of HIV infection among breastfed babies whose HIV-infected mothers had a one-month course of AZT was about 22% at age 24 months, compared with 30% among babies whose mothers received no antiretrovirals.

The PETRA trial (coordinated by the UNAIDS secretariat) tested the effectiveness of a number of antiretroviral regimens using two drugs – AZT and lamivudine (3TC) – in combination. When an HIV-positive mother starts taking the two drugs at the time of delivery, and she and her newborn baby continue on the drug regimen for just one week following birth, the risk of the baby becoming infected is reduced to about 12% when measured at 6 weeks

of age, as compared with a 19% risk when no antiretroviral drugs at all are given. An even bigger reduction – to 8% -- is seen when the drug regimen is started at 36 weeks of pregnancy, around a month before delivery. At 18 months of age however, the benefits are almost completely washed out because of transmissions that occur during prolonged mixed feeding.

In July 1999, the US National Institutes of Health released the results of a joint Uganda-US study assessing the preventive efficacy of a single dose of the antiretroviral drug nevirapine, given to the mother during labour and to the baby within the first three days of life. Measured at 12 months of age, HIV infection was found in only 16% of the (breastfed) infants who received nevirapine (compared to 24% when a 1 week ZDV regimen was used).

### **Safe infant feeding practices**

Breastfeeding has been the cornerstone of child health and survival strategies for the past two decades and has played a pivotal role in reducing infant mortality in many countries. Even in the era of AIDS, breastfeeding remains the best possible nutrition for the great majority of babies and it is important that the practice by women who are HIV-negative or whose HIV status is unknown continues actively to be promoted, protected and supported.

However, more than one-third of MTCT is attributable to prolonged mixed feeding (i.e. breastfeeding plus other liquids/solid introduce very early) and these feeding practices wash out an important part of antiretroviral efficacy. Complete avoidance of breastfeeding is the only way to totally avoid postnatal transmission but, if women do not get support to replace feed safely, the risks associated with replacement feeding may counterbalance the benefits. It has been suggested that exclusive breastfeeding may lower the risk of transmission when compared to mixed feeding. If confirmed, exclusive breastfeeding associated with early and complete cessation would become an attractive option.

### **Other interventions targeting pregnancy, labour and delivery**

The other interventions that have been explored for their potential to prevent MTCT include:

- *Delivery by Caesarean section:* There is a relatively high risk of transmission during delivery due to presence of the virus in blood and mucus in the birth canal. Delivery by Caesarean section before onset of labour reduces the child's exposure to the mother's body fluids during birth and has been shown to lower the risk of HIV infection. However, it is not a wide-scale solution because of its cost, logistical requirements and risk of post-operative complications.
- *Cleansing the birth canal during labour and delivery:* To reduce exposure to HIV in the birth canal, various methods of vaginal washing (lavage) before and during delivery are being investigated. In a trial performed in Malawi, lavage using chlorhexidine showed no overall difference in rates of MTCT, but did show a significant reduction in cases where membranes were

ruptured for more than four hours; it also resulted in significant reduction of infant mortality and morbidity.

- *Other obstetrical modifications* can reduce contact between the infant and the mother's infected body fluids. These involve avoiding episiotomies, unnecessary artificial rupture of membranes, fetal scalp electrodes and other invasive procedures.
- *Vitamin A supplements*: A deficiency of vitamin A in HIV-infected mothers is associated with a higher risk of transmission from mother to child. However, trials in Malawi and South Africa have shown no effect of vitamin A supplementation on the risk of MTCT (see Fawzi et al in key materials).
- *Immunization*: Studies in Haiti and Uganda are currently investigating passive immunization of women and children (infusion of HIV-specific neutralizing antibodies). Research on vaccine development (active immunization) may also prove successful eventually.

For more detailed information on these preventive methods, see "HIV in pregnancy: A review" in the Key Documents.

#### **THE VARIABLE RISK OF MTCT**

In summary, the rates of mother-to-child transmission of HIV under the different circumstances are as follows:

- \* Where no drugs are administered and the baby is predominantly breastfed for about 24 months by its HIV-positive mother, the risk of infection is generally around 30-35%.
- \* Where no drugs are administered and the baby is not breastfed by its HIV-positive mother, the risk of infection is around 20%.
- \* Where a short-course of antiretrovirals (AZT alone, AZT+3TC or NVP) is administered and the baby is not breastfed, the risk of infection is around 10%.
- \* Where a short-course of antiretrovirals is administered, and the baby is breastfed by its HIV-positive mother, the risk of infection is between 15% and 25% according to the mode and duration of breastfeeding.
- \* Where a long course of antiretrovirals is administered and elective C-section is performed, the risk of infection is around 1%.

## ***The challenges***

The progress of research into prevention through antiretrovirals and other interventions suggest strongly that MTCT interventions will come into much wider use in the near future. The most important challenge is to ensure that basic HIV/AIDS and reproductive health services are ready to integrate the new interventions.

### **Rising need for voluntary counselling and testing services**

As interventions become more widespread, HIV-infected women would have to know their HIV status in order to benefit from them. Therefore, voluntary counselling and testing (VCT) services will be required on larger scale than is currently available in most countries. This implies an expansion of VCT in general and within prenatal programmes. The decision to take an HIV test is never an easy one. The acceptability of VCT will likely be related to the quality of the services (confidential, non-coercive, non-judgemental...), the level of tolerance vis-a-vis HIV+ people, and the availability of psychological support, and care services for HIV-positive women. There is a growing realization that acceptability will be limited unless VCT programmes for MTCT prevention also target the male partners. However, the counselling component of VCT is often seen as being time consuming, adding to already heavy workloads, difficult and emotionally draining. Acceptance of different models of counselling interventions need to be tested.

### **Reorganization of pre-, peri- post-natal care and family planning**

Expanding access to counselling, testing, family planning services and antenatal and postnatal care - along with adapting obstetrical practices and introducing antiretroviral regimens - will have a heavy impact on clinical facilities. All aspects of providing and monitoring treatment of mothers and children will have to be planned and implemented. Prenatal care will be the first area affected but, since infants born to HIV-infected mothers will need extra care themselves, postnatal settings will also come under pressure. HIV testing and the monitoring of HIV infection and antiretroviral treatment will also impose extra work on laboratories. Family planning services for HIV+ women, and especially for those choosing not to breastfeed, will need strengthening.

### **Decision-making about infant feeding**

In developing countries, prolonged breastfeeding is heavily promoted for all children because it is a natural, cheap means of providing adequate nutrition and protection against many childhood diseases, with birth-spacing as a secondary benefit. In comparison, the cost of infant formula, along with the clean water and fuel needed to prepare it, is often beyond the means of poor families in developing countries. Furthermore, when incorrectly used feeding

with infant formula may lead to severe malnutrition and fatal infectious diseases. Even safely used, it may also lead to stigma and rejection for women who find they are infected and, after counselling, decide not to breastfeed - a visible act in most developing countries. The choice of feeding method can thus be a difficult dilemma for an HIV-positive mother and health care-givers who will have difficulties to understand that breastfeeding may not be always the best option.

### **Remaining questions about antiretrovirals, infant feeding and MTCT**

The efficacy of short course antiretrovirals in preventing HIV transmission from an HIV-positive mother is now well established. However, as for any effective treatment, ZDV, 3TC and NVP induce rare but severe toxic effects. Two cases of infant deaths related to mitochondrial dysfunction have been reported in France after exposure to ZDV alone or ZDV in combination with 3TC. Extensive review of infant deaths in American children (over 20000 children followed) did not evidence any additional case. During use of NVP, although for longer duration than to prevent MTCT, 0.3% of patients present severe rashes called Stevens-Johnson syndrome. In addition, NVP resistant virus can be selected after a single dose of NVP. The potential implications of temporary selection of resistant virus for subsequent pregnancies or future therapeutic options for the mother, should they become available, is unknown.

Studies are still needed to assess the risks and benefits of exclusive breastfeeding associated with early and complete cessation of breastfeeding, and to look at ways to reduce transmission while continuing breastfeeding through, for example, prescription of antiretrovirals during a reduced period of breastfeeding.

### **Care for orphans**

Around the world, over 11 million children have already lost their mothers – and often their fathers - before they were 15 years old. Although some of these children will be infected and others will not, all will need care and support as they grow up. In many countries, the extended family is the traditional social security system which looks after orphans and affected families. But this system is being pushed to the breaking point in the worst affected communities -- long before the full impact of AIDS has been felt. Preventing MTCT of HIV may increase the number of HIV-uninfected children that are orphaned and need social support. However, it is important to recognize that in the absence of preventive interventions, more HIV-positive children will be born and require not only support but medical care.



## ***The responses***

With the advances described earlier in this document, the world is considerably better equipped today than even one year ago to help pregnant HIV-positive women to safeguard the health of their children. Nonetheless, it must be emphasized that the best means of reducing mother-to-child transmission remains primary prevention – making sure that women of childbearing age do not get infected in the first place; and family planning – making sure that parents have children if and when they wish.

Any national strategy to prevent mother-to-child transmission of HIV should therefore be part of broader strategies to prevent the transmission of HIV and STDs, to care for HIV-positive women and their families, and to promote maternal and child health. The ability to make interventions to reduce MTCT widely available, and as soon as possible, depends on political will, affordability of the interventions, and the strength of existing human resources and infrastructures.

### **The protection of girls and women from HIV infection.**

This will minimize the risk that women of childbearing age are carrying the virus in the first place. It involves promoting safe and responsible sexual behaviour in couples, providing them with knowledge about HIV/AIDS and how to prevent infection, and ensuring that they have the necessary personal skills and access to condoms so that they can act on their knowledge. It also means providing good quality, user-friendly prevention and treatment programmes for other sexually transmitted diseases (STDs), the presence of which increases the risk of HIV transmission as much as 6-10 fold. And, crucially, it means taking steps to deal with the cultural, legal and economic factors that make girls and women specially vulnerable to HIV infection by limiting their autonomy and power to protect themselves.

### **Referrals to family planning programmes**

It is every woman's fundamental right to decide for herself, without coercion, whether or not to have children. The responsibility of the government and health services is to provide HIV-positive women and their partners with comprehensive information and education about the risks associated with childbearing as part of routine public information about HIV/AIDS, to ensure they have real choices of action, and to respect and support the decisions they reach. This means providing good quality, user-friendly and easily accessible family planning services so that HIV-positive women can avoid pregnancy if they choose, and similarly acceptable and accessible abortion services, where the procedure is legal, so that they can terminate pregnancy if desired.

Women who choose replacement feeding because of their HIV infection should also receive advice on contraception to replace the birth-spacing effect of breastfeeding.

In many high HIV prevalence countries, bearing healthy children provides social status and access to family resources—access denied to women whose HIV-infected children sicken and die. To that extent, interventions to reduce HIV transmission from mother to child can help a woman consolidate her social position, despite her HIV infection.

### **Create an optimal setting for service delivery**

In countries with well functioning health systems, the additional service delivery costs of interventions to prevent MTCT may already be affordable. Other countries may require more substantial investments to strengthen their health infrastructure to permit incorporation of large-scale interventions. Where applicable, traditional health and community support systems should also be fully utilized. Such investments will have a broad beneficial effect on the health sector more generally and should be encouraged.

The following characterize the optimum settings in which to implement MTCT prevention interventions:

- All women should have knowledge about HIV and access to the information necessary to make appropriate choices about HIV prevention, sexual and reproductive health, and infant feeding in the context of HIV.
- HIV counselling and testing should be available for pregnant women, those contemplating pregnancy, and their partners.
- All pregnant women should have access to antenatal, delivery and post-partum care, and to a skilled attendant at birth.
- There should be follow-up of children at least until 18 months, especially regarding nutrition and childhood illnesses.
- Women should have easy access to affordable contraceptives.
- Medical and other support services should be accessible to HIV-infected mothers and their families
- Human rights, including reproductive rights and the rights to informed choices and confidentiality, should be respected. This means that the social and medical environment must enable women and families to make informed choices and cope with the choices they make.

### **Voluntary counselling and testing**

All women should have access to voluntary HIV testing. This means testing must be done with the informed consent of the woman, using reliable laboratory tests and ensuring confidentiality (see *Counselling and voluntary testing for pregnant women in high HIV prevalence countries*. UNAIDS key material). The benefits of information, counselling and HIV testing are not limited to situations where expensive treatment interventions are available (see box), and HIV counselling and testing in relation to pregnancy and other reproductive health services may prove a valuable entry point for provision of

counselling and voluntary testing to the wider community of healthy and asymptomatic women and their partners.

In places where acceptability of VCT is poor, carefully designed and monitored pilot programmes will enable health and social service providers to better define counselling requirements and design measures such as long-term support for families that include HIV-positive members, family planning referral, spouse counselling, and communication programmes such as campaigns against discrimination. Many innovative approaches are being developed, and countries are evaluating, documenting and sharing their experiences.

***The benefits of information, counselling and voluntary HIV testing for different clients in reproductive health settings—A summary***

*Potential mothers and fathers*

Counselling and voluntary HIV testing can help women and men who may be considering forming or expanding their families to:

- weigh up the risks and advantages of a pregnancy
- make choices about contraception
- make choices about preventing future HIV infection including condom use

*Pregnant women who test HIV-negative*

Counselling a woman following a negative test can help a woman

- understand and maintain safe behaviour to avoid future infection
- breastfeed for the greatest health of the infant

*Pregnant women who test HIV-positive*

Counselling a women following a positive test can help a woman

- decide whether to share her HIV status with anyone, and if so with whom
- choose to terminate her pregnancy where safe, legal and available
- choose antiretroviral therapy where available
- understand infant feeding options and choose that which is best in her circumstances
- learn more about HIV infection and its implications for her health
- access support groups and health services that promote positive living
- make choices about sexual behaviour and future fertility

*Partners of pregnant women*

Counselling and voluntary testing of partners of pregnant women helps couples

- support one another in decisions about care and infant feeding
- make decisions about future fertility
- chose behaviours which reduce the risk of contracting or spreading HIV

*The wider community*

Widespread availability and use of counselling and voluntary testing for HIV in a community can

- reduce fear, ignorance and stigma surrounding HIV
- stimulate a community response in support of those needing care
- contribute to an environment supportive of safer sexual behaviour
- reduce spillover of artificial feeding to HIV-negative mothers

### **Infant feeding programmes**

An important response to MTCT is to ensure safe, affordable alternatives to traditional breastfeeding. In industrialized countries, HIV-positive mothers are advised not to breastfeed and, if necessary, are provided with free infant formula. In Thailand, where there is relatively wide access to safe water, HIV-positive mothers are starting to be given free infant formula by the government, provided with information on risk factors, and encouraged not to breastfeed. In most Latin American countries, HIV-positive women are encouraged to avoid breastfeeding.

Realistic and sustainable options in many settings may eventually include exclusive breastfeeding and early cessation of breastfeeding. Home-prepared formula made from animal milks, typically from cows, goats, buffaloes or sheep may help to achieve early weaning. Whatever options eventually become available, counselling programmes will be required to help pregnant women make free and informed choices and to support them in whatever decision they take (see box).

### **The health of the mother**

The use of short-course antiretroviral monotherapy during pregnancy increases an HIV-positive woman's chances of having a healthy child without harming her own health. However, it is not a treatment for her. HIV-positive mothers are generally asymptomatic, and at this stage of HIV infection it would not benefit them to continue on antiretroviral monotherapy after giving birth. Where long-term antiretroviral treatments are not yet affordable, HIV-infected mothers and other family members should have early access to drugs that can prevent and treat opportunistic infections (particularly tuberculosis), to social and community support, and to support against discrimination and rejection. Indeed, MTCT prevention is intended to be integrated with other HIV/AIDS and MCH programmes and result in better care and other support services for those found to be HIV-positive.

### **Improving affordability of interventions**

The principal factors that affect the affordability of interventions to prevent MTCT are:

- cost of drugs
- cost of safe alternatives to breastfeeding
- cost of HIV tests.

- cost of counselling

The recent trial results allow use of shorter, and therefore cheaper antiretroviral regimens. The cheapest regimen option today is nevirapine, which costs approximately 4 US\$ to treat a mother-child pair. In addition to the breakthrough made by the recent trials, WHO's addition of zidovudine and nevirapine to the Essential Drug List facilitates bulk purchasing at negotiated prices. Negotiations between UNAIDS and pharmaceutical industry are ongoing.

Any effort to reduce the cost of using commercial alternatives to breast milk for HIV-positive mothers must conform to the International Code of Marketing of Breast-Milk Substitutes and subsequent World Health Assembly resolutions. However, this still provides considerable flexibility for price negotiations, bulk buying and distribution programmes.

The challenge of reducing the cost of HIV tests is being addressed in a number of ways. Since 1990, WHO has helped governments and agencies to obtain high-quality test kits through negotiation of bulk purchase prices from manufacturers. The average price per kit purchased under this programme is around US\$1.00. Nearly half of the kits are simple-and-rapid test kits. (For more information see UNAIDS Technical Update *HIV Testing Methods*.)

In most developing countries, specialist counsellors are in short supply. And there is unlikely to be enough money available to train and hire as many specialist counsellors as would be needed in the context of routine antenatal care. It is recommended rather to diffuse the work of providing information and of counselling as efficiently as possible through the hierarchy of care. Much of the routine provision of basic information about HIV transmission, prevention and testing for example, can be done in groups.

### **Cost-effectiveness of MTCT prevention**

A recent analysis of the economics of MTCT prevention in low-income countries (see Marseilles in the Key Documents) estimated a cost per case averted of US \$298 for use of a single dose of NVP to both mother and child in settings where HIV prevalence is 30%. Costs taken into account were the antiretroviral itself, test kits, service delivery costs. Although data on costs of treating HIV+ children are scarce, best available data from South-Africa indicate a cost of approximately 300 US\$, similar to the cost per averted case. Where more resources are put in child care, the costs per case averted will clearly become much lower than the care cost, and the use of antiretrovirals to prevent MTCT will become cost saving. The cost estimates per averted case correspond to US \$11 (using NVP) per disability-adjusted life year (DALY), figures that compare favourably with other HIV and non HIV-related interventions in sub-Saharan Africa. (Note that the World Bank suggests that interventions costing around \$50 per DALY compare favourably with other uses of health resources in low- and middle-income countries.).

### **Evidence-based advocacy**

The most powerful means of effecting change generally lies in demonstrating the success of interventions through well monitored pilot programmes. In Botswana for example, the government has decided to scale-up the intervention after an initial pilot period of 8 months: The Botswanan Prevention of Mother-to-Child Transmission (MTCT) of HIV Program was launched in Gaborone and Francistown in April 1999. Voluntary counselling and testing was offered to all pregnant women in government health facilities. Oral AZT was provided to HIV-positive women starting at 34 weeks of pregnancy and during labour and AZT syrup was given to the babies born to HIV-positive mothers. The intervention also included infant feeding counselling and provision of infant formula to women who opt not to breastfeed. In the first 8 months of the program, out of 7,000 ANC clients, over 4,000 have been counselled, of which 46% have been tested, and 41% were found positive. By January 2000, 221 women and 367 infants had received AZT. A programme review, done in January 2000, suggested some ways to overcome the obstacles encountered during the pilot phase such as developing an adequate IEC strategy, mobilising communities and increasing coverage with pre-test counselling through more widespread counselling training of health care workers. The review team concluded that scaling-up was advisable.

Given the vital importance of breast milk for child health, and the proven risk of HIV transmission through breastfeeding, it is now crucial that governments and public health authorities develop policies on HIV infection and infant feeding. The following excerpts from the UNAIDS, UNICEF and WHO joint guidelines on HIV and infant feeding provide policy-makers with key elements for formulating such policies. (The full text of these guidelines can be requested from UNAIDS or viewed on the Internet at <http://www.unaids.org>)

*Decision-makers need to consider the following:*

*....If the government offers free or subsidized breast-milk substitutes to some or all HIV-positive mothers who choose not to breastfeed, these mothers must be assured of breast-milk substitutes for at least 6 months. Additional costs include micronutrient supplements and extra health care costs for non-breastfed children. Against this can be set reduced costs of treating fewer children with AIDS.*

*....The risk of giving replacement feeds must be less than the risk of HIV transmission through breastfeeding, or there is no point in using them. Essential elements include knowledge and commitment on the part of care-givers, safe water, assured supplies of affordable fuel, easy access to quality health care for mothers and infants, and a good level of support from counsellors and/or social workers. Women choosing not to breastfeed will need extra support and counselling.*

*....If free or subsidized breast-milk substitutes are to be offered, they need to be distributed efficiently to the mothers who are eligible for them, but controlled to prevent spillover to mothers who are HIV negative or of unknown status.*

## ***Selected key materials***

Coutsoudis A, Pillay K, Spooner E et al. Influence of infant-feeding patterns on early mother-to-child transmission of HIV-1 in Durban, South-Africa: a prospective study. *Lancet* 1999;354:471-76. The authors suggest that exclusive breastfeeding may carry a much lower risk of HIV transmission than mixed feeding.

European Mode of Delivery Collaboration. Elective C-section versus vaginal delivery in prevention of vertical transmission: a randomised clinical trial. *Lancet* 1999; **353**: 1035-39. Analysis of 370 infants on risk of MTCT related to mode of delivery shows that elective C-section significantly lowers the risk of MTCT.

Fawzi WW, Msamanga GI, Spiegelman D et al. Randomized Trial of Effects of Vitamin Supplements on Pregnancy Outcomes and T Cell Counts in HIV-1-Infected Women in Tanzania. *The Lancet* 1998; 351: 1477-1482. The study results show no effect of vitamin A supplementation on HIV transmission, but a reduction in overall maternal and infant morbidity and mortality.

Guay LA, Musoke P, Fleming T, et al. Intrapartum and neonatal single-dose nevirapine compared with zidovudine for prevention of mother-to-child transmission of HIV-1 in Kampala, Uganda: HIVNET 012 randomised trial. *Lancet* 1999; 354: 795-802. This paper reports on the efficacy of nevirapine given at a single dose to the mother at onset of labour, and to the infant within 3 days of life.

Marseilles E, Kahn KG, Mmiro F et al. Cost-effectiveness of single-dose nevirapine regimen for mothers and babies to decrease vertical HIV-1 transmission in sub-Saharan Africa. *Lancet* 1999; **354**: 803-809. This analysis compares cost-effectiveness of different antiretroviral regimens for the prevention of MTCT.

Nduati R, John G, Mbori-Ngacha D et al. Effect of breastfeeding and formula feeding on transmission of HIV-1: A randomized clinical trial. *JAMA* 2000; 283:1167-74. In this randomized trial, 44% of HIV transmissions were found attributable to breastfeeding.

UNAIDS, UNICEF and WHO. HIV and infant feeding. Geneva: UNAIDS, UNICEF, World Health Organisation, 1998. Three modules were published (1) Guidelines for decision-makers (2) A Guide for health care managers and supervisors (3) A review of HIV transmission through breastfeeding. Available on the UNAIDS website at <http://www.unaids.org>

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WHO and UNAIDS. HIV in pregnancy: A review. UNAIDS/99.35E. Discussion of MTCT risk factors, and of interventions currently available or under study. Available on the UNAIDS website